

## PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2001-226173

(43)Date of publication of application : 21.08.2001

(51)Int.Cl. C04B 38/00  
B01D 53/86  
B01J 35/04  
C04B 35/195  
C04B 41/85

(21)Application number : 2000-361395

(71)Applicant : DENSO CORP

(22)Date of filing : 28.11.2000

(72)Inventor : MURATA MASAKAZU

(30)Priority

Priority number : 11347354

Priority date : 07.12.1999

Priority country : JP

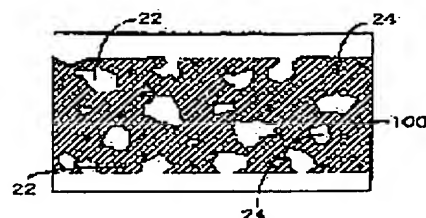
## (54) MANUFACTURING PROCESS OF HONEYCOMB STRUCTURE

(57)Abstract:

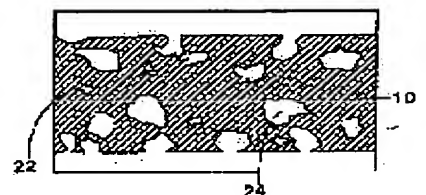
PROBLEM TO BE SOLVED: To provide a honeycomb structure manufacturing process by which sufficient compressive strength of a honeycomb structure and good catalyst-supporting properties are obtained.

SOLUTION: This manufacturing process comprises: preparing a mixed liquid obtained by mixing a component capable of lowering the cordierite crystalline phase formation temperature with a solvent, applying the mixed liquid to a base body and thereafter firing the resulting body.

(a)



(b)



## LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

BEST AVAILABLE COPY

[Date of registration]

[Number of appeal against examiner's decision  
of rejection]

[Date of requesting appeal against examiner's  
decision of rejection]

[Date of extinction of right]

Copyright (C); 1998,2003 Japan Patent Office

(19) 日本国特許庁 (J P)

(12) 公開特許公報 (A)

(11) 特許出願公開番号

特開2001-226173

(P 2 0 0 1 - 2 2 6 1 7 3 A)

(43) 公開日 平成13年 8月21日 (2001. 8. 21)

(51) Int. Cl. <sup>7</sup>	識別記号	F I	テーマコード (参考)
C04B 38/00	304	C04B 38/00	304 Z 4D048
B01D 53/86		B01J 35/04	301 P 4G019
B01J 35/04	301	C04B 41/85	D 4G030
C04B 35/195		B01D 53/36	C 4G069
41/85		C04B 35/16	A
審査請求 未請求 請求項の数 8 O L (全 7 頁)			

(21) 出願番号 特願2000-361395 (P 2000-361395)

(22) 出願日 平成12年11月28日 (2000. 11. 28)

(31) 優先権主張番号 特願平11-347354

(32) 優先日 平成11年12月 7日 (1999. 12. 7)

(33) 優先権主張国 日本 (J P)

(71) 出願人 000004260

株式会社デンソー

愛知県刈谷市昭和町1丁目1番地

(72) 発明者 村田 雅一

愛知県刈谷市昭和町1丁目1番地 株式会  
社デンソー内

(74) 代理人 100096998

弁理士 碓氷 裕彦 (外 1 名)

最終頁に続く

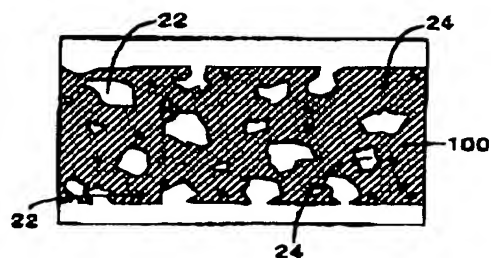
(54) 【発明の名称】 ハニカム構造体の製造方法

(57) 【要約】

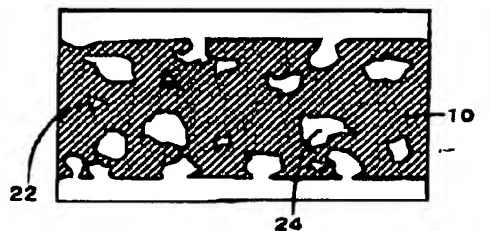
【課題】 十分な圧縮強度を得ることができるとともに、触媒担持性が良好なハニカム構造体の製造方法を提供するものである。

【解決手段】 そのため、本発明は、コーゼライトの結晶相形成温度を下げる成分を溶媒に混合させた混合液を準備し、該混合液を基体に付着させ、その後焼成するというハニカム構造体の製造方法とするものである。

(a)



(b)



## 【特許請求の範囲】

【請求項1】 主成分の化学成分が重量基準で $\text{SiO}_2$ が42～56%、 $\text{Al}_2\text{O}_3$ が30～42%、 $\text{MgO}$ が12～18%で結晶相の主成分がコーゼライトとなる隔壁をハニカム状に設けてなるハニカム構造体の製造方法において、

$\text{SiO}_2$ 、 $\text{Al}_2\text{O}_3$ 及び $\text{MgO}$ を主成分とする基体を用意し、

該基体に対して、前記基体の焼成により形成される結晶相であるコーゼライト結晶の形成温度を下げる成分を溶媒に混合させた混合液を付着させ、その後、焼成することを特徴とするハニカム構造体の製造方法。

【請求項2】 前記焼成温度は、前記混合液付着前の前記基体の焼成温度近傍であることを特徴とする請求項1記載のハニカム構造体の製造方法。

【請求項3】 前記基体に対して、前記混合液は、前記基体を構成する隔壁全表面積の80%以上に付着させることを特徴とする請求項1記載のハニカム構造体の製造方法。

【請求項4】 前記基体に対して、前記混合液は、前記基体を構成する隔壁全表面積の90%以上に付着させることを特徴とする請求項1記載のハニカム構造体の製造方法。

【請求項5】 前記ハニカム構造体に前記混合液を付着させた後、余分に付着した前記混合液を除去する余剰液除去工程を行うことを特徴とする請求項1乃至4のいずれか1項記載のハニカム構造体の製造方法。

【請求項6】 前記混合液を付着させる基体は未焼成の基体であり、かつ、前記混合液の前記溶媒は非水溶性有機媒体であることを特徴とする請求項1乃至4のいずれか1項記載のハニカム構造体の製造方法。

【請求項7】 前記混合液の成分は、少なくとも、タルク、アルミナ、カオリン、鉄、チタンの少なくとも一種よりなることを特徴とする請求項1乃至4のいずれか1項記載のハニカム構造体の製造方法。

【請求項8】 主成分の化学成分が重量基準で $\text{SiO}_2$ が42～56%、 $\text{Al}_2\text{O}_3$ が30～42%、 $\text{MgO}$ が12～18%で結晶相の主成分がコーゼライトとなる隔壁をハニカム状に設けてなるハニカム構造体の製造方法において、

$\text{SiO}_2$ 、 $\text{Al}_2\text{O}_3$ 及び $\text{MgO}$ を主成分とする基体を焼成し焼成体とし、

該焼成体に対して、前記基体成分の少なくとも一部を溶媒に混合させた原料混合液を付着させ、再度、焼成することを特徴とするハニカム構造体の製造方法。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】 本発明は、排ガス浄化装置の触媒担体に用いられるコーゼライトの結晶相を主成分

とするハニカム構造体の製造方法に関するものである。

## 【0002】

【従来の技術】 従来の排ガス浄化装置の触媒担体に用いられるコーゼライトの結晶相を主成分とするハニカム構造体は、特開平6-165939号公報に示されるようなハニカム構造体が知られていた。

## 【0003】

【発明が解決しようとする課題】 しかしながら、このようなコーゼライトの結晶相を主成分とするハニカム構造体では、前述の公報の図3にも示されるように、気孔率が小である場合には、圧縮強度が強い反面、触媒担持量が小となってしまう、また、気孔率が大きい場合には、触媒担持量が多い反面、圧縮強度が弱くなってしまいうという関係がある。

【0004】 そのため、圧縮強度が強く、かつ触媒担持量が多いハニカム構造体を得ることは、容易なことではなかった。

【0005】 本発明は、上記問題点を鑑みたものであり、十分な圧縮強度を得ることができるとともに、触媒担持性が良好なハニカム構造体の製造方法を提供するものである。

## 【0006】

【課題を解決するための手段】 そこで、本発明においては、主成分の化学成分が重量基準で $\text{SiO}_2$ が42～56%、 $\text{Al}_2\text{O}_3$ が30～42%、 $\text{MgO}$ が12～18%で結晶相の主成分がコーゼライトとなる隔壁をハニカム状に設けてなるハニカム構造体の製造方法において、 $\text{SiO}_2$ 、 $\text{Al}_2\text{O}_3$ 及び $\text{MgO}$ を主成分とする基体を用意し、該基体に対して、前記基体の焼成により形成される結晶相であるコーゼライトの結晶相形成温度を下げる成分を溶媒に混合させた混合液を付着させ、その後、焼成するハニカム構造体の製造方法を提供するものである。

【0007】 上述のように、基体に対して、混合液を付着させ、焼成することにより、触媒の担持性に起因する気孔径が $1\mu\text{m}$ より大なる気孔の全体割合を実質的に減少させることなく、触媒の担持性に影響のない $1\mu\text{m}$ 以下の気孔の全体割合を実質的に減少させることができる。

【0008】 そのため、従来より、小なる気孔の全体割合を低下させることができたので、全体の気孔率を低くし強度を向上させることができるとともに、大なる気孔の存在量の減少が実質的にないので、従来に比して、触媒担持性を維持できたハニカム構造体を得ることができる。

【0009】 この理由は明確ではないが、我々発明者らにおいては、焼成過程において、基体を構成する隔壁表面において、コーゼライトの結晶形成温度を下げたので、焼成時には、隔壁表面よりコーゼライトの結晶相が形成される。この時、隔壁におけるコーゼライト結

晶の段階的な形成時に、小なる径を有する気孔が優先的に消失するものと思われる。

【0010】尚、前記焼成温度は、前記混合液付着前の前記基体の焼成温度近傍とすることが好ましい。このように、焼成温度を前記基体の焼成温度近傍とすることにより、より効果的に小なる径である気孔を減少させることができる。

【0011】ここで、焼成温度近傍とは、実質的に基体が焼成できればよい温度であればよく、理論的な焼成温度でなければならないものではない。

【0012】また、前記基体に対して、前記混合液は、前記基体を構成する隔壁全表面積の80%以上に付着させること、さらに好ましくは、隔壁全表面積の90%以上に付着させることが好ましい。

【0013】このように、基体の隔壁全表面積の80%、好ましくは90%以上にあらかじめ混合液を付着焼成させることにより、得られるハニカム構造体の略全体にわたって、小なる気孔を減少でき、そのため強度が向上されるとともに、触媒担持性の優れたハニカム構造体を提供することができる。

【0014】また、上記ハニカム構造体に上記混合液を付着させた後、余分に付着した混合液を除去する余剰液除去工程を行うことが好ましい。

【0015】この方法を採用することにより、ハニカム構造体に対して、余分な混合液を除去させることができるので、略均一的に混合液を塗布することが可能となる。

【0016】さらに、上記混合液を付着させる基体は未焼成の基体であり、かつ、上記混合液の上記溶媒は非水溶性有機媒体であることが好ましい。

【0017】この方法によれば、混合液を塗布しようとする基体が未焼成であるので、基体の焼成と同時に、所望のハニカム構造を得ることができる。

【0018】また、コーゼライトの結晶相形成温度を下げる成分は、コーゼライトを構成する原料の一部である、タルク、アルミナ、カオリンおよびこれらの混合物である。ただし、これらすべてを混合することはない。また、コーゼライトの不純物となる成分、鉄、チタンを用いてもよい。

【0019】さらに、基体を焼成した後、焼成体とし、この焼成体に対して、前記基体成分の少なくとも一部を溶媒に混合させた原料混合液を付着させ、再度、焼成することが好ましい。

【0020】この場合には、予め焼成体を $k$ み性する隔壁の小なる気孔中に、原料混合液を注入させ、焼成させることにより、小なる気孔を減少させる。

【0021】この方法によれば、すでに焼成した焼成体に対し、混合液を塗布しているので、塗布する焼成体が安定的であり、原料混合液の塗布工程を容易に行うことができる。

### 【0022】

【発明の実施の形態】（実施形態例1）以下、本発明の実施形態例にかかるハニカム構造体につき、図1～図5を用いて説明する。

【0023】本実施形態のハニカム構造体1は、図1に示すような主成分がコーゼライトとなる円柱状のハニカム構造体1である。このハニカム構造体1は、円柱状の周壁13内に、隔壁10をハニカム状に設けている。尚、この隔壁10は、厚みが約100 $\mu$ mであり、かつ一辺約1.27mmの四角形状のセル18を多数設けたものである。

【0024】図1(b)は、ハニカム構造体1を横からみた図である。

【0025】図2に示す如く、ハニカム構造体1は、排ガス浄化装置6の内部に触媒を担持させた状態で設置される。そして、ハニカム構造体1の隔壁10により構成されるセル18内に、排ガス8を通過させることにより、排ガスを浄化させている。

【0026】このようなハニカム構造体1を製造するに当たっては、まず、焼成することによりコーゼライト結晶相となるように、タルク、カオリン、仮焼カオリン、アルミナをそれぞれの成分比および粒度等を調整して原料を整える。そして、この原料を、図示しない公知の金型にて押し出し成形し、押し出し成形品を乾燥させてハニカム状の基体3を得る。

【0027】次に、図3(a)に示す如く、コーゼライトの結晶形成温度を下げる成分として、タルク25wt%と非水溶性有機溶媒75wt%（例えば、石油系炭化水素）とからなる混合液7を予め作成しておく。な

【0028】お、上記タルクは、例えば、コーゼライトを構成する他の材料あるいは、コーゼライト成分に対する不純物に置き換えることもできる。

【0028】ついで、図3(b)に示す如く、基体3を混合液7に基体のほぼ全体を一度に浸漬することによって、基体3を構成する隔壁全表面積の約95%に混合液7を付着させる。

【0029】ここで、基体3を構成する隔壁全表面積の約95%程度しか混合液7を付着できなかったのは、基体3全体を混合液7中に浸漬させても、浸漬中において、

【0029】基体3中の気泡が完全に除去できないためであった。しかしながら、基体3の混合液中への浸漬時における、基体3の気泡の除去が完全に可能であれば、隔壁全表面積の100%程度に混合液を付着させることが好ましい。しかしながら、隔壁全表面積の80%以上、好ましくは90%以上が混合液に付着されていれば、十分な強度を得ることができる。

【0030】この基体3の混合液7への浸漬により、図3(c)の斜線で示されるように、基体3の隔壁30のほぼ全体に、混合液7が塗布される。

【0031】その後、隔壁30に余剰に付着された混合

液7を、余剰液除去工程であるエアブローもしくは吸引にて除去する。

【0032】基体3に対して、混合液7を付着することにより、付着前においては、焼成により $\text{SiO}_2$ が50wt%、 $\text{Al}_2\text{O}_3$ が36wt%、 $\text{MgO}$ が14wt%よりなるコーゼライトを主成分とするハニカム構造体であるのを、焼成により $\text{SiO}_2$ が51wt%、 $\text{Al}_2\text{O}_3$ が33wt%、 $\text{MgO}$ が16wt%よりなるコーゼライトを主成分とするハニカム構造体とした。

【0033】これは、混合液7の付着により、基体を構成するコーゼライトの結晶相形成温度である約1460℃を、混合液3付着により、約1430℃と結晶相形成温度を低くしたことを意味している。

【0034】次いで、混合液7の付着によりコーゼライトの結晶相形成温度を下げた基体3を、混合液7付着前の基体3の焼成温度である1400℃で1時間焼成する。

【0035】図4(a)に、混合液を付着させることなしで、基体を焼成した従来のハニカム構造体を、また図4(b)に、上述のように混合液を付着させて基体を焼成した本実施形態のハニカム構造体のそれぞれの隔壁の断面図を模式的に示す。

【0036】また、従来と本実施形態の隔壁に細孔径と細孔容積との関係を図5に示す。尚、図5のaを従来のハニカム構造体とし、bを本実施形態により得られたハニカム構造体の細孔径と細孔容積との関係を示す。

【0037】図4(a)(b)および図5に示されるように、本実施形態のハニカム構造体の隔壁10は、隔壁10のコーゼライト結晶相形成温度を低下させることにより、従来のハニカム構造体の隔壁10に比べて、触媒担持性に起因しない余分な細孔である1μm以下の小なる気孔20のみを実質的に減少させることができたことがわかる。

【0038】そのため、本実施形態の隔壁の気孔率は、小なる気孔が減少したので、混合液を塗布しない場合の気孔率である35%よりも小である25%とでき、隔壁の強度を向上させることができた。それとともに、大なる気孔の減少が実質的に抑制できたので、触媒の担持量を維持させることができた。

【0039】本実施形態例1と比較例とのハニカム構造体の端面強度および触媒担持量の比較を図6および図7として示す。

【0040】ここで使用したハニカム構造体は、外形形状がφ103mm、長さが105mmの円筒形状であり、セルは、隔壁厚さ約50μmで900メッシュとした。

【0041】図6および図7より、本実施形態例1のハニカム構造体は、比較例のハニカム構造体と比して、触媒担持性を維持させたまま、端面での強度が向上させることができたことがわかる。

【0042】(実施形態例2) 上記実施形態例1では、混合液3の付着前では、焼成により、 $\text{SiO}_2$ が50wt%、 $\text{Al}_2\text{O}_3$ が36wt%、 $\text{MgO}$ が14wt%のコーゼライト成分で代表される図8のA領域であるのを、混合液3の付着後においては、焼成により、 $\text{SiO}_2$ が51wt%、 $\text{Al}_2\text{O}_3$ が33wt%、 $\text{MgO}$ が16wt%のコーゼライト成分で代表されるB領域の組成を有する基体3とした。

【0043】しかしながら、焼成後に得られる組成である領域Bの組成は、焼成後に得られるハニカム体の熱膨張係数が、領域Aのそれよりも高く、ハニカム構造体に要求される特性の一つである熱衝撃性に劣る場合がある。

【0044】そこで、実施形態例2においては、混合液3の付着前では、隔壁の組成として、焼成により、 $\text{SiO}_2$ が49wt%、 $\text{Al}_2\text{O}_3$ が39wt%、 $\text{MgO}$ が12wt%のコーゼライト成分で代表される図8のC領域であるのを、混合液3の付着後においては、焼成により、 $\text{SiO}_2$ が50wt%、 $\text{Al}_2\text{O}_3$ が36wt%、 $\text{MgO}$ が14wt%のコーゼライト成分で代表されるA領域の組成を有する基体3とした。

【0045】このように、混合液3の付着によって、焼成後には、従来のコーゼライト組成になるように、当初の原料組成比を設定することにより、気孔率が小さく強度が向上するとともに触媒担持性がよいのみでなく、熱膨張係数の上昇をも抑制することのできたハニカム構造体を提供することができた。

【0046】上記実施形態例1および2では、焼成前の基体に混合液7を付着する方法を採用した。しかしながら、本発明は、これに限定されるものでなく、例えば、焼成後のハニカム構造体に対して、混合液を塗布し、その後、再焼成してもよい。この場合には、焼成後に混合液を塗布する時において、混合液中の成分として、融点低下成分であるタルクにバインダーと水とを混合させたものを使用することが好ましい。

【0047】また、上記実施形態例1および2においては、図3に示されるように、混合液中にハニカム構造体全体を浸漬させ、浸漬後、余分な混合液を除去することにより、ハニカム構造体に混合液を塗布したが、本発明はこれに限られるものでない。例えば、図8に示されるように、ハニカム構造体の一端と他端に、混合液導入部材30及び混合液排出部材32を設け、所定の混合液7を流し、その後、余分な混合液を除去することにより、ハニカム構造体に混合液を塗布してもよい。

【図面の簡単な説明】

【図1】図1(a)は、本発明の第1実施形態例における、ハニカム構造体の正面図及び図1(b)は、本発明の第1実施形態例におけるハニカム構造体の側面図である。

【図2】図2は、実施形態例1における排ガス浄化装置

に組み込んだハニカム構造体である。

【図3】図3は、実施形態例1における、ハニカム構造体の製造手順を示す説明図である。

【図4】図4(a)は、従来のハニカム構造体の隔壁の断面拡大模式図であり、図4(b)は、本発明のハニカム構造体の隔壁の断面拡大模式図である。

【図5】図5は、本発明と従来とのハニカム構造体の細孔径と細孔容積との関係を示す特性図である。

【図6】図6は、実施形態1と比較例との端面強度の比較を示す説明図である。

【図7】図7は、実施形態1と比較例との触媒担持量の比較を示す説明図である。

【図8】図8は、本発明を説明する説明図である。

【図9】図9は、ハニカム構造体の製造手順の他の方法を示す説明図である。

【付号の説明】

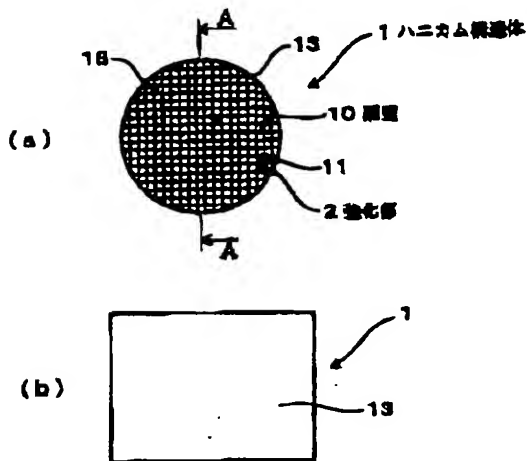
1…ハニカム構造体

7…混合液

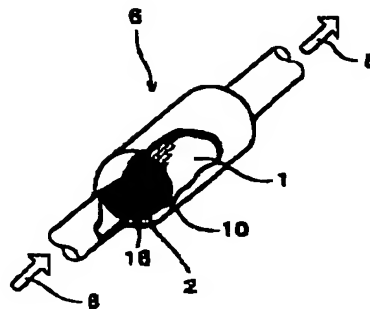
10…隔壁

10

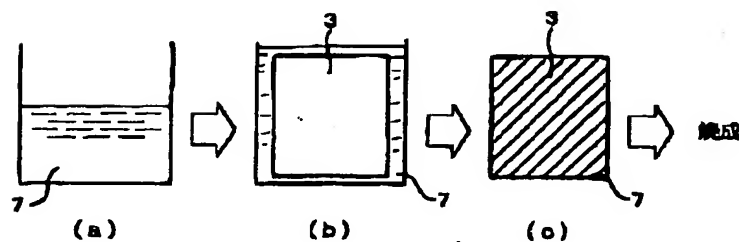
【図1】



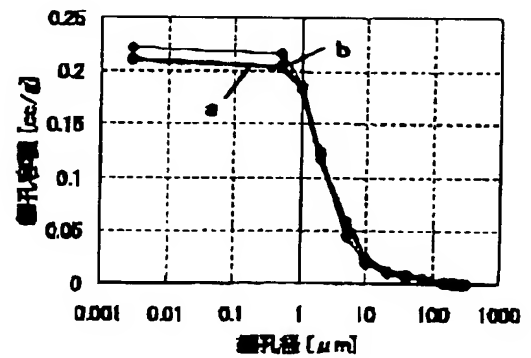
【図2】



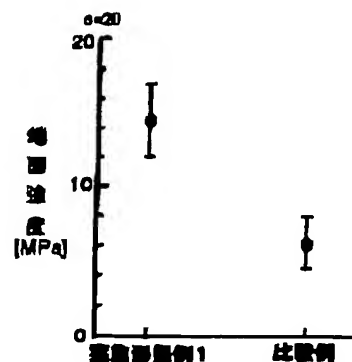
【図3】



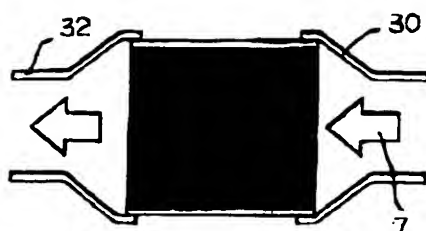
【図5】



【図6】

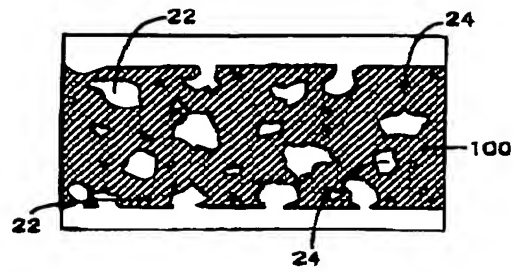


【図9】

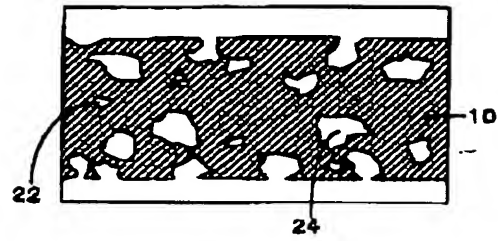


【図 4】

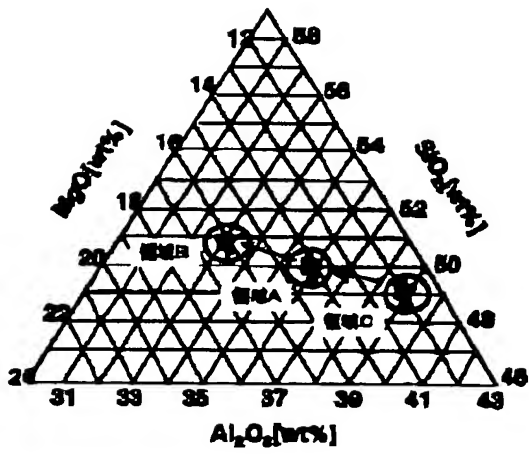
(a)



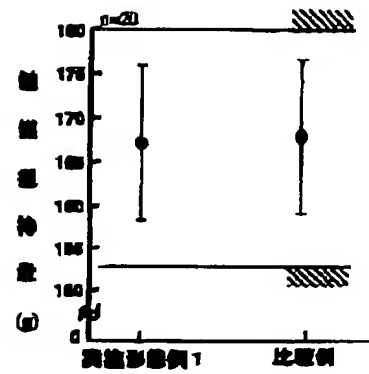
(b)



【図 8】



【図 7】





フロントページの続き

F ターム(参考) 4D048 BA10X BB02  
4G019 GA02  
4G030 AA07 AA36 AA37 BA34 CA01  
CA10 GA13 GA35  
4G069 AA01 AA08 BA01A BA04A  
BA10A BA13A BA13B BA15A  
BA15B BB04A BC66A CA02  
CA03 EA19 EB12Y EB14Y  
FA01 FB06 FB15 FB23 FB33  
FB66 FB67 FC08

## PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2001-226173

(43)Date of publication of application : 21.08.2001

(51)Int.Cl.

C04B 38/00  
B01D 53/86  
B01J 35/04  
C04B 35/195  
C04B 41/85

(21)Application number : 2000-361395

(71)Applicant : DENSO CORP

(22)Date of filing : 28.11.2000

(72)Inventor : MURATA MASAKAZU

(30)Priority

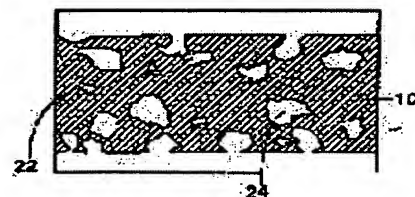
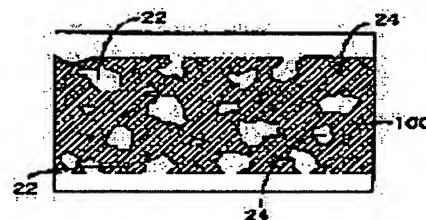
Priority number : 11347354 Priority date : 07.12.1999 Priority country : JP

## (54) MANUFACTURING PROCESS OF HONEYCOMB STRUCTURE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a honeycomb structure manufacturing process by which sufficient compressive strength of a honeycomb structure and good catalyst- supporting properties are obtained.

SOLUTION: This manufacturing process comprises: preparing a mixed liquid obtained by mixing a component capable of lowering the cordierite crystalline phase formation temperature with a solvent, applying the mixed liquid to a base body and thereafter firing the resulting body.



## LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

Copyright (C); 1998,2003 Japan Patent Office

## \* NOTICES \*

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

CLAIMS

---

[Claim(s)]

- [Claim 1] In the manufacture approach of a honeycomb structure object that the chemical entity of a principal component comes to prepare the septum by which aluminum 2O3 serves as [ the principal component of a crystal phase ] 30 to 42% 42 to 56%, and MgO serves as [ SiO2 ] cordierite at 12 - 18% on weight criteria in the shape of a honeycomb Prepare the base which uses SiO2, aluminum2O3, and MgO as a principal component, and this base is received. The manufacture approach of the honeycomb structure object which the mixed liquor which made the solvent mix the component which lowers the formation temperature of the cordierite crystal which is the crystal phase formed of baking of said base is made to adhere, and is characterized by calcinating after that.
- [Claim 2] Said burning temperature is the manufacture approach of the honeycomb structure object according to claim 1 characterized by being near the burning temperature of said base before said mixed liquor adhesion.
- [Claim 3] Said mixed liquor is the manufacture approach of the honeycomb structure object according to claim 1 characterized by making it adhere to 80% or more of all the septum surface areas that constitute said base to said base.
- [Claim 4] Said mixed liquor is the manufacture approach of the honeycomb structure object according to claim 1 characterized by making it adhere to 90% or more of all the septum surface areas that constitute said base to said base.
- [Claim 5] The manufacture approach of claim 1 characterized by performing the surplus liquid removal process of removing said mixed liquor which adhered too much after making said mixed liquor adhere to said honeycomb structure object thru/or the honeycomb structure object of four given in any 1 term.
- [Claim 6] It is the manufacture approach of claim 1 which the base to which said mixed liquor is made to adhere is a non-calcinated base, and is characterized by said solvent of said mixed liquor being a nonaqueous solubility organic medium thru/or the honeycomb structure object of four given in any 1 term.
- [Claim 7] The component of said mixed liquor is the manufacture approach of claim 1 characterized by the thing of talc, an alumina, a kaolin, iron, and titanium consisted of a kind at least thru/or the honeycomb structure object any 1 publication of 4 at least.
- [Claim 8] In the manufacture approach of a honeycomb structure object that the chemical entity of a principal component comes to prepare the septum by which aluminum 2O3 serves as [ the principal component of a crystal phase ] 30 to 42% 42 to 56%, and MgO serves as [ SiO2 ] cordierite at 12 - 18% on weight criteria in the shape of a honeycomb The manufacture approach of the honeycomb structure object which calcinate the base which uses SiO2, aluminum2O3, and MgO as a principal component, consider as a baking object, and the raw material mixed liquor which made the solvent mix said a part of base component [ at least ] is made to adhere to this baking object, and is again characterized by calcinating.

---

[Translation done.]

## \* NOTICES \*

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

DETAILED DESCRIPTION

---

## [Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the manufacture approach of the honeycomb structure object which uses as a principal component the crystal phase of the cordierite used for the catalyst support of an exhaust gas purge.

[0002]

[Description of the Prior Art] The honeycomb structure object as the honeycomb structure object which uses as a principal component the crystal phase of the cordierite used for the catalyst support of the conventional exhaust gas purge shown in JP,6-165939,A was known.

[0003]

[Problem(s) to be Solved by the Invention] However, with the honeycomb structure object which uses the crystal phase of such cordierite as a principal component, while compressive strength is strong when porosity is smallness as shown also in drawing 3 of the above-mentioned official report, when the amount of catalyst support becomes smallness and porosity is size, while there are many amounts of catalyst support, there is relation that compressive strength will become weak.

[0004] Therefore, it was not easy for compressive strength to acquire a honeycomb structure object with many amounts of catalyst support strongly.

[0005] This invention offers the manufacture approach of a honeycomb structure object with good catalyst support nature while being able to obtain sufficient compressive strength in view of the above-mentioned trouble.

[0006]

[Means for Solving the Problem] Then, in this invention, the chemical entity of a principal component sets the septum by which aluminum 2O3 serves as [ the principal component of a crystal phase ] 30 to 42% 42 to 56%, and MgO serves as [ SiO2 ] cordierite at 12 - 18% on weight criteria to the manufacture approach of the honeycomb structure object which it comes to prepare in the shape of a honeycomb. Prepare the base which uses SiO2, aluminum2O3, and MgO as a principal component, and this base is received. The mixed liquor which made the solvent mix the component which lowers the crystal phase formation temperature of the cordierite which is the crystal phase formed of baking of said base is made to adhere, and the manufacture approach of the honeycomb structure object to calcinate is offered after that.

[0007] As mentioned above, the whole pore rate of 1 micrometer or less which does not have effect in the support nature of a catalyst can be decreased substantially, without decreasing substantially the whole pore rate that the pore diameter which originates in the support nature of a catalyst by making mixed liquor adhere and calcinating to a base consists of 1 micrometer size.

[0008] therefore, the former -- smallness -- since the whole pore rate was reduced, while being able to make the whole porosity low and being able to raise reinforcement -- size -- since there is no reduction of the abundance of pore substantially, as compared with the former, the honeycomb structure object which has maintained catalyst support nature can be acquired.

[0009] Although this reason is not clear, since whenever [ crystal form Nariatsu / of cordierite ] was lowered, in us the artificers, the crystal phase of cordierite is formed from a septum front face in a baking process in the septum front face which constitutes a base at the time of baking. the time of gradual formation of a cordierite crystal [ in / at this time / a septum ] -- smallness -- it is thought that the pore which has a path disappears preferentially.

[0010] In addition, as for said burning temperature, it is desirable to carry out near the burning temperature of said base before said mixed liquor adhesion. thus, the thing done near the burning temperature of said base for burning temperature -- more -- effective -- smallness -- the pore which is a path can be decreased.

[0011] Here, it must not be a theoretical burning temperature near the burning temperature that what is necessary is just the temperature which just calcinates a base substantially.

[0012] Moreover, it is desirable to make it adhere to 80% or more of all the septum surface areas from which said mixed liquor constitutes said base to said base, and to make it adhere to 90% or more of all septum surface areas still more preferably.

[0013] thus, the abbreviation whole of the honeycomb structure object acquired 80% by [ of all the septum surface areas of a base ] making adhesion baking of the mixed liquor make it 90% or more beforehand preferably -- crossing -- smallness -- while pore can be decreased, therefore reinforcement improves, the honeycomb structure object which was excellent in catalyst support nature can be offered.

[0014] Moreover, after making the above-mentioned mixed liquor adhere to the above-mentioned honeycomb structure object, it is desirable to perform the surplus liquid removal process of removing the mixed liquor which adhered too much.

[0015] Since excessive mixed liquor can be made to remove to a honeycomb structure object by adopting this approach, it becomes possible to apply mixed liquor in abbreviation homogeneity.

[0016] Furthermore, the base to which the above-mentioned mixed liquor is made to adhere is a non-calcinated base, and, as for the above-mentioned solvent of the above-mentioned mixed liquor, it is desirable that it is a nonaqueous solubility organic medium.

[0017] Since the base which is going to apply mixed liquor has not been calcinated according to this approach, desired honeycomb structure can be acquired to baking of a base and coincidence.

[0018] Moreover, the components which lower the crystal phase formation temperature of cordierite are the talc and the alumina which are some raw materials which constitute cordierite, kaolins, and such mixture. However, these [ all ] are not mixed. Moreover, the component used as the impurity of cordierite, iron, and titanium may be used.

[0019] Furthermore, after calcinating a base, consider as a baking object, the raw material mixed liquor which made the solvent mix said a part of base component [ at least ] is made to adhere to this baking object, and calcinating is desirable again.

[0020] in this case, the septum which carries out a baking object k \*\*\*\* beforehand -- smallness -- making raw material mixed liquor

pour in into pore, and making it calcinate -- smallness -- pore is decreased.

[0021] Since mixed liquor is applied to the already calcinated baking object according to this approach, the baking object to apply is stable and the spreading process of raw material mixed liquor can be performed easily.

[0022]

[Embodiment of the Invention] (Example 1 of an operation gestalt) It explains hereafter using drawing 1 - drawing 5 about the honeycomb structure object concerning the example of an operation gestalt of this invention.

[0023] The honeycomb structure object 1 of this operation gestalt is the cylinder-like honeycomb structure object 1 with which a principal component as shown in drawing 1 serves as cordierite. This honeycomb structure object 1 has formed the septum 10 in the shape of a honeycomb in the cylinder-like peripheral wall 13. In addition, thickness is about 100 micrometers and this septum 10 forms many square-like cels 18 which are about 1.27mm per side.

[0024] Drawing 1 (b) is drawing which saw the honeycomb structure object 1 from width.

[0025] As shown in drawing 2, the honeycomb structure object 1 is installed in the interior of the exhaust gas purge 6 in the condition of having made the catalyst supporting. And exhaust gas is made to purify by passing exhaust gas 8 in the cel 18 constituted by the septum 10 of the honeycomb structure object 1.

[0026] In manufacturing such a honeycomb structure object 1, talc, a kaolin, a temporary-quenching kaolin, and an alumina are adjusted for each component ratio, grain size, etc., and a raw material is prepared so that it may become a cordierite crystal phase by calcinating first. And extrusion molding of this raw material is carried out with the well-known metal mold which is not illustrated, extrusion is dried, and the honeycomb-like base 3 is obtained.

[0027] Next, as shown in drawing 3 (a), the mixed liquor 7 which consists of talc 25wt% and nonaqueous solubility organic solvent 75wt% (for example, petroleum system hydrocarbon) is beforehand created as a component which lowers whenever [ crystal form Nariatsu / of cordierite ]. In addition, the above-mentioned talc can also be transposed to other ingredients which constitute cordierite, or the impurity to a cordierite component.

[0028] Subsequently, mixed liquor 7 is made to adhere to about 95% of all the septum surface areas that constitute a base 3 for a base 3 by [ of a base ] immersing the whole at once mostly into mixed liquor 7, as shown in drawing 3 (b).

[0029] Here, even if it made the base 3 whole immersed into mixed liquor 7, mixed liquor 7 has been adhered about 95% of all the septum surface areas that constitute a base 3, because the air bubbles in a base 3 were not able to remove completely during immersion. However, if removal of the air bubbles of the base 3 at the time of immersion into the mixed liquor of a base 3 is completely possible, it is desirable to make mixed liquor adhere to about 100% of all septum surface areas. however, all septum surface areas -- 80% or more, if mixed liquor adheres 90% or more of preferably, sufficient reinforcement can be obtained.

[0030] it is shown by the slash of drawing 3 R> 3 (c) by immersion to the mixed liquor 7 of this base 3 -- as -- the septum 30 of a base 3 -- mixed liquor 7 is mostly applied to the whole.

[0031] Then, the mixed liquor 7 to which the septum 30 adhered at the surplus is removed by the Ayr blow or suction which is a surplus liquid removal process.

[0032] SiO<sub>2</sub> considered as the honeycomb structure object which uses as a principal component cordierite which aluminum 2O<sub>3</sub> becomes 33wt(s)% 51wt(s)%, and MgO becomes [ SiO<sub>2</sub> ] from 16wt(s)% by baking about it being the honeycomb structure object which uses as a principal component cordierite which aluminum 2O<sub>3</sub> becomes 36wt(s)% 50wt(s)%, and MgO becomes from 14wt (s)% by baking before adhesion by adhering mixed liquor 7 to the base 3.

[0033] This means having made low about 1430 degrees C and crystal phase formation temperature by mixed liquor 3 adhesion for about 1460 degrees C which is the crystal phase formation temperature of the cordierite which constitutes a base by adhesion of mixed liquor 7.

[0034] Subsequently, the base 3 which lowered the crystal phase formation temperature of cordierite by adhesion of mixed liquor 7 is calcinated for 4 hours at 1400 degrees C which is the burning temperature of the base 3 before mixed liquor 7 adhesion.

[0035] The sectional view of each septum of the honeycomb structure object of this operation gestalt which mixed liquor was made for the conventional honeycomb structure object which calcinated the base to adhere without making mixed liquor adhere to drawing 4 (a) to drawing 4 R> 4 (b) as mentioned above again, and calcinated the base is shown typically.

[0036] Moreover, the relation between pore size and pore volume is shown in the septum of the former and this operation gestalt at drawing 5. In addition, a of drawing 5 is used as the conventional honeycomb structure object, and the relation of the pore size of a honeycomb structure object and pore volume which were obtained according to this operation gestalt in b is shown.

[0037] 1 micrometer or less which is the excessive pore which does not originate in catalyst support nature compared with the septum 10 of the conventional honeycomb structure object when the septum 10 of the honeycomb structure object of this operation gestalt reduces the cordierite crystal phase formation temperature of a septum 10 as shown in drawing 4 (a), (b), and drawing 5 -- smallness -- it turns out that only pore 20 was able to be decreased substantially.

[0038] therefore, the porosity of the septum of this operation gestalt -- smallness -- since pore decreased, rather than 35% which is the porosity when not applying mixed liquor, it was able to do with 25% which is smallness, and the reinforcement of a septum was able to be raised. Since reduction of the pore which becomes size with it controlled substantially, the amount of support of a catalyst was able to be maintained.

[0039] The comparison of the end-face reinforcement of the honeycomb structure object of this example 1 of an operation gestalt and the example of a comparison and the amount of catalyst support is shown as drawing 6 and drawing 7.

[0040] The honeycomb structure object used here has the shape of a cylindrical shape whose appearance configuration is 105mm, and phi103mm and die length made the cel 900 meshes by about 50 micrometers in septum thickness.

[0041] Drawing 6 and drawing 7 show that the reinforcement in an end face was able to raise the honeycomb structure object of this example 1 of an operation gestalt, maintaining catalyst support nature as compared with the honeycomb structure object of the example of a comparison.

[0042] In the above-mentioned example 1 of an operation gestalt, (Example 2 of an operation gestalt) Before adhesion of mixed liquor 3 By baking, SiO<sub>2</sub> sets that it is the area A of drawing 8 where aluminum 2O<sub>3</sub> is represented 36wt(s)%, and MgO is represented with a 14wt(s)% cordierite component after adhesion of mixed liquor 3 50wt(s)%. By baking, SiO<sub>2</sub> considered as the base 3 which has the presentation of the area B where aluminum 2O<sub>3</sub> is represented 33wt(s)%, and MgO is represented with a 16wt(s)% cordierite component 51wt(s)%.

[0043] However, the presentation of the field B which is the presentation acquired after baking may have the coefficient of thermal expansion of the honeycomb object acquired after baking higher than that of Field A, and may be inferior to the thermal shock nature which is one of the properties required of a honeycomb structure object in it.

[0044] In the example 2 of an operation gestalt so, before adhesion of mixed liquor 3 As a presentation of a septum, SiO<sub>2</sub> sets that it is the C region of drawing 8 where aluminum 2O<sub>3</sub> is represented 39wt(s)%, and MgO is represented with a 12wt(s)% cordierite

component after adhesion of mixed liquor 3 49wt(s)% by baking. By baking SiO<sub>2</sub> considered as the base 3 which has the presentation of the area A where aluminum 2O<sub>3</sub> is represented 36wt(s)%, and MgO is represented with a 14wt(s)% cordierite component 50wt (s)%.

[0045] Thus, by adhesion of mixed liquor 3, after baking, while porosity is small and reinforcement improved by setting up the original raw material presentation ratio so that it might become the conventional cordierite presentation, catalyst support nature is not only good, but it was able to offer the honeycomb structure object which was also able to control the rise of a coefficient of thermal expansion.

[0046] In the above-mentioned examples 1 and 2 of an operation gestalt, the approach of adhering mixed liquor 7 to the base before baking was adopted. However, this invention is not limited to this, and may apply mixed liquor to the honeycomb structure object after baking, for example, may re-calcinate it after that. In this case, when applying mixed liquor after baking, it is desirable to use the thing which made the talc which is a melting point fall component mix a binder and water as a component in mixed liquor.

[0047] Moreover, in the above-mentioned examples 1 and 2 of an operation gestalt, although mixed liquor was applied to the honeycomb structure object by making the whole honeycomb structure object immersed into mixed liquor, and removing excessive mixed liquor after immersion as shown in drawing 3, this invention is not restricted to this. For example, as shown in drawing 8, mixed liquor may be applied to a honeycomb structure object by forming the mixed liquor induction material 30 and the mixed liquor discharge member 32 in the end and the other end of a honeycomb structure object, and removing a sink and mixed liquor excessive after that for the predetermined mixed liquor 7.

---

[Translation done.]

## \* NOTICES \*

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

DESCRIPTION OF DRAWINGS

---

[Brief Description of the Drawings]

[Drawing 1] The front view and drawing 1 (b) of a honeycomb structure object are the side elevation of the honeycomb structure object in the example of the 1st operation gestalt of this invention. [ in / in drawing 1 (a) / the example of the 1st operation gestalt of this invention ]

[Drawing 2] Drawing 2 is the honeycomb structure object built into the exhaust gas purge in the example 1 of an operation gestalt.

[Drawing 3] Drawing 3 is the explanatory view in the example 1 of an operation gestalt showing the manufacture procedure of a honeycomb structure object.

[Drawing 4] Drawing 4 (a) is the cross-section extension mimetic diagram of the septum of the conventional honeycomb structure object, and drawing 4 (b) is the cross-section extension mimetic diagram of the septum of the honeycomb structure object of this invention.

[Drawing 5] Drawing 5 is the property Fig. showing the relation between the pore size of the honeycomb structure object of this invention and the former, and pore volume.

[Drawing 6] Drawing 6 is the explanatory view showing the comparison of the end-face reinforcement of the operation gestalt 1 and the example of a comparison.

[Drawing 7] Drawing 7 is the explanatory view showing the comparison of the amount of catalyst support of the operation gestalt 1 and the example of a comparison.

[Drawing 8] Drawing 8 is an explanatory view explaining this invention.

[Drawing 9] Drawing 9 is the explanatory view showing other approaches of the manufacture procedure of a honeycomb structure object.

[Explanation of an encoder signal]

1 -- Honeycomb structure object

7 -- Mixed liquor

10 -- Septum

---

[Translation done.]



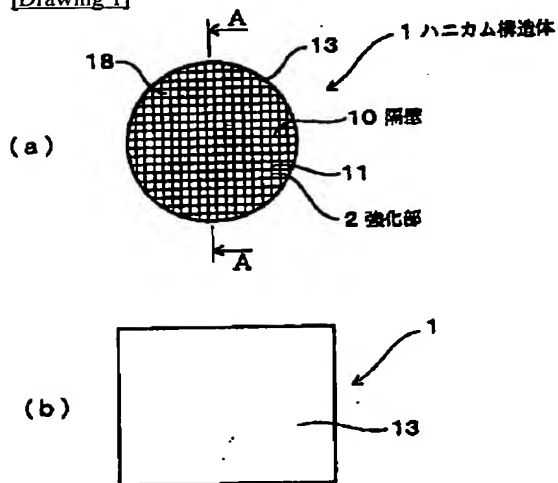
## \* NOTICES \*

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

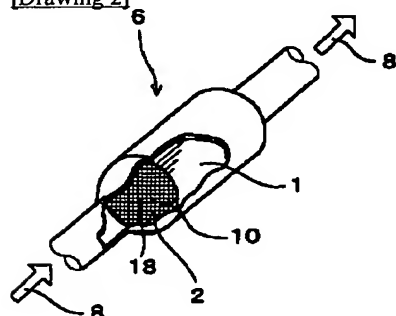
1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

## DRAWINGS

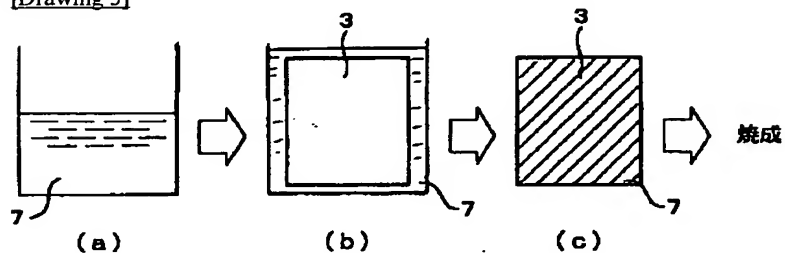
[Drawing 1]



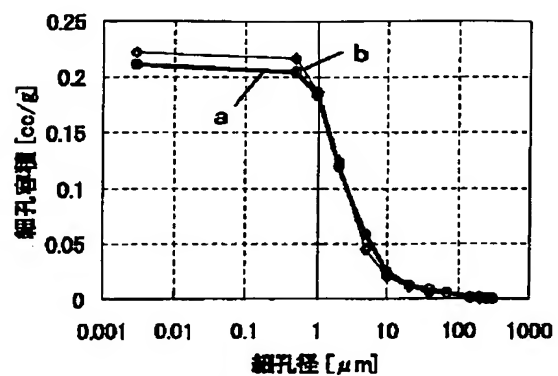
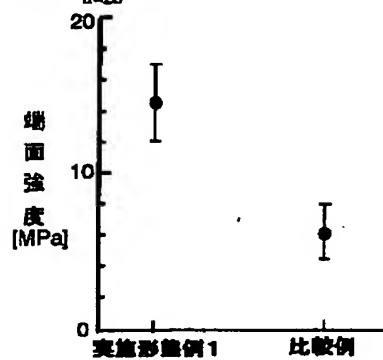
[Drawing 2]



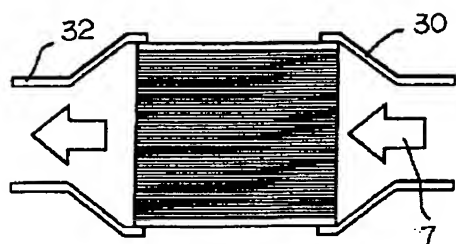
[Drawing 3]



[Drawing 5]

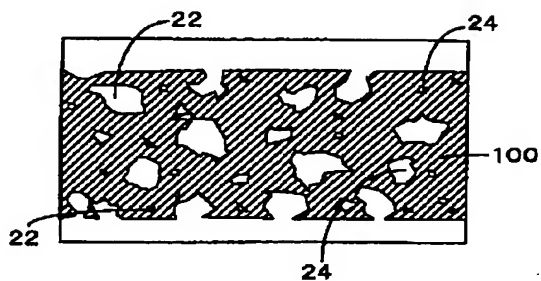
[Drawing 6]  
n=20

[Drawing 9]

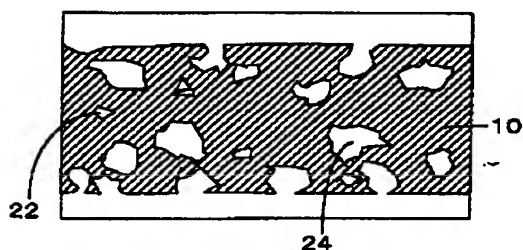


[Drawing 4]

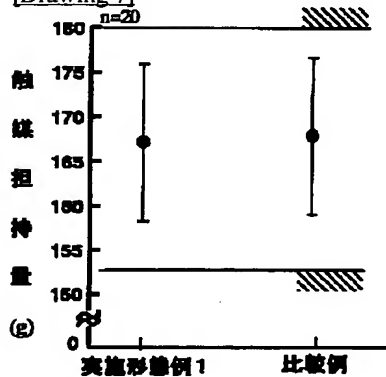
(a)



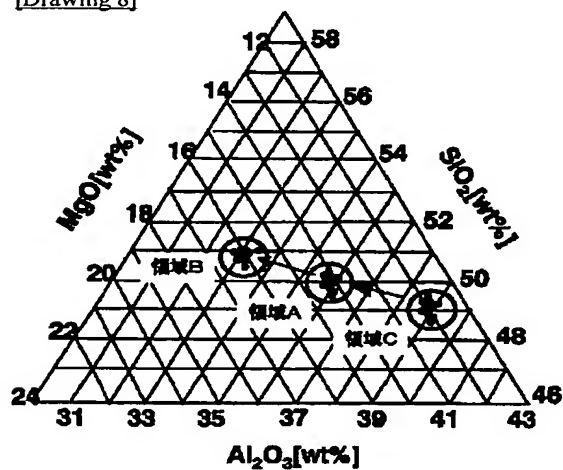
(b)



[Drawing 7]



[Drawing 8]



BEST AVAILABLE COPY

[Translation done.]